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# *Indian Standard*

# SPECIFICATION FOR CANNED PAPAYA IN SYRUP

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**MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG**
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**Gr 4** *February* 1983

# *Indian Standard*

# SPECIFICATION FOR CANNED PAPAYA IN SYRUP

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( *Continued on page* 2 )

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( *Continued on page* 16 )

# AMENDMENT NO. 1 MARCH 1996
# TO
# IS 10253 :1982 SPECIFICATION FOR CANNED PAPAYA IN SYRUP

( *Page* 3, *Foreword, clause* **0.4** ) — Insert the following clause **0.5** after **0.4** and renumber the subsequent clause:

'**0.5** A scheme for labelling environment friendly products known as ECO-Mark has been introduced at the instance of the Ministry of Environment and Forests (MEF), Government of India. The ECO-Mark shall be administered by the Bureau of Indian Standards (BIS) under the *BIS Act*, 1986 as per the Resolution No. 71 dated 20 February 1991 and Resolution No. 425 dated 28 October 1992 published in the Gazette of the Government of India. For a product to be eligible for marking with the ECO-Mark it shall also carry the Standard Mark of BIS for quality besides meeting additional environment friendly (EF) requirements. The environment friendly requirements for canned papaya in syrup are, therefore, included through Amendment No. 1 to this standard.

This amendment is based on the Gazette Notification No. 624 (E) dated 6 September 1995 for Labelling Beverages, Infant Foods, Processed Fruits and Vegetable Products as environment friendly, published in the Gazette of the Government of India.'

( *Page* 7, *clause* **5.5.5** ) — Insert the following new matter after **5.5.5**:

"**5.6 Additional Requirements for ECO-Mark**

**5.6.1** *General Requirements*

**5.6.1.1** The product shall conform to the requirements prescribed under **5.1** to **5.5.5**.

**5.6.1.2** The manufacturer shall produce the consent clearance as per the provisions of *Water (PCP) Act*, 1974, *Water (PCP) Cess Act*, 1977 and *Air (PCP) Act*, 1981 along with the authorization if required under *Environment (Protection) Act*, 1986 and the Rules made thereunder to Bureau of Indian Standards while applying for the ECO-Mark and the product shall also be in accordance with the *Prevention of Food Adulteration Act*, 1954 and the Rules made thereunder. Additionally, FPO 1955 (Fruit Product Order) framed under *Essential Commodities Act*, 1955, *Standards of Weight and Measures Act*, 1977 requirements wherever applicable has to be complied with.

5.6.1.3 The product packaging may also display in brief the criteria based on which the product has been labelled environment friendly.

5.6.1.4 The material used for product packing shall be recyclable or biodegradable.

5.6.1.5 The date of packing and date of expiry shall be declared on the product package by the manufacturer.

5.6.1.6 The product shall be microbiologically safe when tested as per IS 5403 : 1969 'Method for yeast and mould count' and IS 5887 ( Part 5 ) : 1976 'Methods for detection of bacteria responsible for food poisoning: Part 5 Isolation, identification and enumeration of *Vibrio Cholerae* and *Vibrio Parahaemolyticus* ( *first revision* )' and shall be free from bacterial and fungal toxins.

5.6.1.7 The pesticide residues, if any in the product shall not exceed the limit as prescribed in *PFA Act*, 1954 and the Rules made thereunder.

5.6.1.8 The product package or leaflet accompanying it may display instructions of proper use, storage and transport (including refrigeration temperature compliance) so as to maximize the product performance, safety and minimize wastage.

5.6.2 *Specific Requirements*

5.6.2.1 The product shall not contain any of the heavy metal contaminants in excess of the quantities prescribed in Table 2."

( *Page* 10, *clause* **6.2.3** ) — Insert the following new clause after **6.2.3**:

**'6.3 ECO-Mark**

The product may also be marked with the ECO-Mark, the details of which may be obtained from Bureau of Indian Standards.'

( FAD 10 )

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Reprography Unit, BIS, New Delhi, India

# *Indian Standard*

# SPECIFICATION FOR CANNED PAPAYA IN SYRUP

## 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 28 July 1982, after the draft finalized by the Fruits and Vegetables Sectional Committee had been approved by the Agricultural and Food Products Division Council.

**0.2** Canned papaya in syrup is the product prepared from ripe papaya of suitable varieties. The papaya are peeled, seeds removed and packed in syrup. They are processed in appropriate manner before and after being sealed in containers so as to prevent spoilage.

**0.3** Canned papaya in syrup is a product of commercial importance in India and occupy a very prominent place among the processed fruit. There is ample scope for the development of the external as well as internal trade. It is, however, necessary to ensure the quality of the products, if the demand is to be maintained and further developed. In order to ensure maintenance of proper quality, it is necessary to have a strict quality control based on specifications. It was, therefore, found necessary to formulate an Indian Standard specification for this product.

**0.4** In the preparation of this standard, due consideration has been given to the provisions of the Prevention of Food Adulteration Act, 1954; the Prevention of Food Adulteration Rules, 1955 and the Fruit Products Order, 1955. However, this standard is subject to the restriction imposed under these, wherever applicable.

**0.5** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

## 1. SCOPE

**1.1** This standard prescribes the requirements for canned papaya ( *Carica papaya* ) in syrup.

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*Rules for rounding off numerical values ( *revised* ).

## 2. TERMINOLOGY

**2.0** For the purpose of this standard, the following definitions shall apply.

**2.1 Fill of Container** — Expressed as water capacity of the container. The water capacity of the container is the volume of distilled water at 20° C which the sealed container will hold when completely filled.

**2.2 Drained Mass** — The mass of the product obtained after cutting open the can and draining of the syrup ( *see* **7** of IS : 2860-1964* ).

**2.3 Cut-Out Syrup** — The syrup obtained after cutting open the can and draining.

**2.4 Absence of Defects** — Freedom from extraneous materials, such as peel and seeds, scrapping and also freedom from damage due to mechanical injury.

**2.4.1** *Blemished Units* — Processed units that are affected with some injury, such as discolouration, pathological and other abnormality readily visible to the naked eye to a noticeable degree.

**2.4.2** *Disintegrated Unit* — Units that have lost the normal shape and from which portions have separated.

**2.5 Can** — Round open top sanitary cans conforming to IS : 9396-1979†.

## 3. VARIETAL TYPES AND STYLES

**3.1 Varietal Types** — The following varieties of papaya may be used for canning:

a) Honey dew, and

b) Washington.

**3.2 Styles** — The styles of canned papaya shall be in the following forms:

a) Slices or cubes of suitable size obtained by cutting peeled papaya longitudinally.

## 4. GRADES

**4.1** Canned papaya in syrup shall be of two grades, namely, Grade 1 and Grade 2 ( *see* Table 1 ).

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*Method of sampling and test for processed fruits and vegetables.

†Specification for round open top sanitary cans.

TABLE 1 NUMBER OF POINTS TO BE SCORED BY DIFFERENT FACTORS

[ 4.1 and 5.5(c) ]

| SL No. | FACTOR | MAXIMUM POINTS | MINIMUM POINTS |  |
|---|---|---|---|---|
|  |  |  | Grade 1 | Grade 2 |
| (1) | (2) | (3) | (4) | (5) |
| i) | Colour | 20 | 15 | 13 |
| ii) | Texture and uniformity of size | 25 | 19 | 16 |
| iii) | Taste and flavour | 20 | 15 | 13 |
| iv) | Absence of defects | 35 | 26 | 23 |

## 5. REQUIREMENTS

**5.1 Hygienic Requirements** — The material shall be prepared and handled under strict hygienic conditions by persons free from contagious and infectious diseases and only in premises maintained in a thoroughly cleaned and hygienic condition and having adequate and safe water supply and duly approved and licensed by the public health authorities concerned ( *see* IS: 6542-1972* ). All workers shall wear clean, white, washed clothing. Necessary precautions shall be taken to prevent incidental contamination of the product from soiled equipment or from personnels suffering from injuries.

**5.1.1** All equipment coming in contact with raw materials or products in the course of manufacture shall be kept clean. An ample supply of steam and water, hose, brushes and other equipment necessary for proper cleaning of machinery and equipment shall be available. The equipment may be sterilised by immersion in, or swabbing with hypochlorite or other suitable chlorine solution.

**5.2 General** — Canned papayas shall be prepared from ripe papayas picked at the proper stage of maturity and of the same variety.

**5.3 Freedom from Artificial Colouring Matter Flavouring and Synthetic Sweetening Agents** — The material shall be free from artificial colouring matter and flavouring and synthetic sweetening agents.

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*Code for hygienic conditions for fruit and vegetable canning units.

**5.4 Requirements for Covering Syrup** —The covering syrup shall be clear. It shall be made from nutritive sweetness, such as sucrose, glucose. The only substances that may be added to the covering syrup are citric acid, ascorbic acid, other permitted acidulants and/or permitted firming agent.

**5.5 Requirements for the Finished Product** — The contents of the can on opening shall display the following characteristics:

a) *Grade 1* — The canned papayas shall possess a good, characteristic, practically unifrom colour; shall be practically uniform in size and symmetry, shall be practically free from defects and practically be intact; shall possess a tender fleshy texture and normally characteristic flavour and shall score not less than 85 points.

b) *Grade 2* — The canned papayas shall possess a good characteristic and reasonably uniform colour; shall be reasonably uniform in size and symmetry; shall be reasonably free from defects and reasonably be intact; shall possess a reasonably tender texture and normal characteristic flavour and shall score not less than 75 points.

c) Scoring shall be done according to the method prescribed in Appendix A. The maximum and minimum number of points to be scored by different factors shall be as given in Table 1.

**5.5.1** *Colour*

a) *Grade 1* — The units shall possess a good, practically uniform colour, characteristic of well matured fruit, which means that the colour shall be bright, practically free from any discolouration due to oxidation, processing or other causes.

b) *Grade 2* — The units shall possess a good and reasonably uniform colour, which means that the colour shall be reasonably bright and charactertistic of matured fruit, but may very slightly in shades of the typical colour, and reasonably free from discolouration due to oxidation, processing or other causes.

**5.5.2** *Texture and Uniformity of Size*

a) *Grade 1* — The units shall possess a tender, fleshy texture, which means that the units shall be thick and fleshy and may be soft but not broken. They shall be uniform in size.

b) *Grade 2* — The units shall possess a tender texture, which means that the units may be soft, but not broken or disintegrated to the extent that their normal shape is altered; they may be slightly firm indicating that fruit is reasonaly mature; they shall be reasonably uniform in size and thickness.

**5.5.3** *Taste and Flavour*

a) *Grade 1* — The units shall possess pleasant aroma and flavour and characteristic of the variety of papaya canned. The taste shall be sweet and characteristic of the variety. The units shall be completely devoid of any objectionable or off taste, smell or odour indicative of unripe fruit.

b) *Grade 2* — The units shall possess pleasant aroma and flavour characteristic of the variety of papayas canned. The taste shall be sweet and characteristic of the variety used. The units shall be devoid of any objectionable or off-taste, and reasonably free from smell or odour indicative of unripe fruit.

**5.5.4** *Absence of Defects*

a) *Grade 1* — The unit shall be practically free from defects, which presumes that none of the units shall be crushed or broken; no peel shall be present. No seeds shall be present, no extraneous material shall be present, not more than 5 percent by count of the units shall be blemished, no units shall be trimmed to the extent that the shape of the units is destroyed. The covering syrup shall be practically clear, practically free from cloudiness, blackening or thickening and than be practically free from fruit pulp.

b) *Grade 2* — The units shall be reasonably free from defects which means that none of the units shall be crushed or broken; no peel shall be present, no seeds shall be present; no extraneous material shall be present, not more than 10 percent by count of the units shall be blemished. In case the units are disintegrated, the disintegrated portion shall not be more than 5 percent by mass of the drained mass. The covering syrup shall be reasonably clear, reasonably free from cloudiness, blackening or thickening and reasonably free from fruit pulp.

**5.5.5** The material shall also conform to the requirements prescribed in Table 2.

### TABLE 2 REQUIREMENTS FOR CANNED PAPAYAS IN SYRUP

( *Clause* 5.5.5 )

| Sl No. | Characteristic | Requirement | Methods of Test Ref To | |
|---|---|---|---|---|
| | | | Cl No. of IS : 2860-1964* | Appendix of IS : 7732-1975† |
| (1) | (2) | (3) | (4) | (5) |
| i) | Vacuum of the can in mm, *Min* | 125 | 5 | — |
| ii) | Fill of the container, percent by mass, *Min* | 90 | 6 | — |
| iii) | Drained mass of the contents of the can as percentage of the net mass, *Min* | 50 | 7 | — |
| iv) | *p*H of cut-out syrup, *Max* | 4·5 | 8 | — |
| v) | Specific gravity of cut-out syrup ( Brix ) | 1·07-1·11<br>(19°-26) | 9 | — |
| vi) | Acidity of cut-out syrup, as an hydrous citric acid, percent by mass, *Max* | 0·8 | 10 | — |
| vii) | Arsenic, mg/kg, *Max* | 0·5 | 13 | — |
| viii) | Lead, mg/kg, *Max* | 1·0 | 14 | — |
| ix) | Copper, mg/kg, *Max* | 5·0 | 15 | — |
| x) | Zinc, mg/kg, *Max* | 5·0 | 16 | — |
| xi) | Tin, mg/kg, *Max* | 250 | 17 | — |
| xii) | Iron, mg/kg, *Max* | 15 | — | B |
| xiii) | Calcium, *Max* | 260 | 12 | — |
| xiv) | Microbiological requirements | To satisfy the requirements of the test | 18 | — |

*Methods of sampling and test for processed fruits and vegetables.
†Specification for apple juice.

## 6. PACKING AND MARKING

### 6.1 Packing

**6.1.1** The material shall be packed in cans made of electrolytic or any other suitable tinplate. The cans shall be suitably lacquered internally and hermetically sealed. The lacquer used shall be non-taxic and conform to IS : 5818-1970*. When lacquered externally, the portion under the label, excepting the side seam, shall also be lacquered. The internal lacquer shall be acid resistant and such that it will not be destroyed, altered or its components transferred to the material inside the can during processing or subsequent storage or transport. The can exterior shall be free from dents, rust, perforations and seam distortion. The cans shall not show leaking, panelling or swell. When lacquered internally the lacqure shall not be disturbed, altered or its components transferred to the material inside the cans during processing or subsequent storage or transportation. Normal feathering shall not be considered as a defect.

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*Specification for lacquers and decorative finishes for good cans.

**6.1.2** The cans shall conform to IS : 9396-1979*.

**6.1.3** *Packing in Cases* — The cans shall be packed in wooden packing cases ( *see* IS : 1503-1979† ) or corrugated fibre board boxes [ *see* IS : 2771 ( Parts I and II )-1977‡ ] or any other case as agreed to between the purchaser and the vendor.

### 6.2 Marking

**6.2.1** Each can shall be marked with the following information:

a) Name, packing medium, style and grade of the material with the brand name; if any;
b) Name and address of the manufacturer;
c) Net mass of the contents of the can in grams;
d) Date of manufacture or code number indicating the date of manufacture;
e) List of ingredients in decending order of proportion; and
f) Manufacturing licence number.

**6.2.2** Each packing can shall also be marked with the following particulars:

a) Name and grade of the product;
b) Name of the manufacturer;
c) Manufacturing licence number; and
d) Number of cans × mass of each can.

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*Specification for round open top sanitary cans.

†Specification for wooden packing cases ( *first revision* ).

‡Specification for fibre board boxes :
Part I Corrugated fibreboard boxes ( *first revision* ).
Part II Solid fibreboard boxes ( *first revision* ).

**6.2.3** The container may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution ( Certification Marks ) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

## 7. SAMPLING

**7.1** The methods of drawing representative samples of the material and the criteria for conformity shall be as prescribed in **3** of IS : 2860-1964*.

## 8. TESTS

**8.1** The samples of canned papayas shall be tested for ascertaining conformity of the material to the requirements of this specification by the methods given in relevant Indian Standards. References to the relevant clauses are given in col 4 and 5 of Table 1.

## APPENDIX A

[ *Clause* 5.5 (c) ]

## METHOD OF SCORING

### A-1. APPARATUS

**A-1.1 White Porcelain Bowls** — Big enough to hold the contents of the can under examination.

**A-1.2 Stainless Steel Spoons** — Table spoons ( *see* IS : 990-1964† ).

### A-2. PROCEDURE

**A-2.1 Panel of Judges** — Scoring of the product shall be done by a panel of three to five judges. All the judges constituting the panel shall be conversant with the factors governing the quality of the product. The cans shall be opened and the contents poured separately into white porcelain bowls. Each judge shall independently examine the contents from each of the cans and assign scores for different characteristics.

---

*Methods of sampling and test for processed fruits and vegetable.

†Specification for spoons, stainless steel.

**A-2.1.1** The judges shall consider the following characteristics:

Colour texture and uniformity of size, taste and flavour, and absence of defects.

**A-2.2 System of Scoring** — The variations within each factor are so described that the scores may be ascertained for each factor and expressed numerically. The relative importance of each factor has been expressed numerically on a scale of 100. Each judge shall give a score for the individual factors by the method described in Table 3 and record his observations in the score sheet for individual judge.

**A-2.2.1** The scores as number of points given on the score sheet by the judge for the contents of each can for the four factors shall be recorded in a tabular form in the score card and the average score calcutated for each factor with overall average for each can entered in the appropriate column of the score card after complying with the conditions specified in **A-2.3.1** and **A-2.3.2**.

### A-2.3 Ascertaining the Grade

**A-2.3.1** *Agreement Among Judges* — To ascertain the consistency of judgement among the judges, the total score assigned by each of them for the contents of the same can shall be calculated by adding up the scores for the various individual characteristics. If the difference between the maximum and the minimum of the total score so obtained does not exceed ( $K + 5$ ), where $K$ is the number of judges, the scoring shall be deemed as consistent for the can under consideration. If the difference exceeds ( $K + 5$ ), the most outlying score, that is, the one which is farthest from its immediate neighbour ( the scores being arranged in one order ) shall be discarded and the consistency among the remaining judges shall be examined.

**A-2.3.2** When the consistency ( *see* **A-2.3.1** ) is thus established, the overall average scores given by the judges whose scoring has been found to be consistent shall be calculated for each can. The average score for each of the individual characteristics shall also be calculated by taking into account the corresponding scores as given by the same judges for the contents of the same can.

**A-2.3.3** *Assignment of Grade* — In order to assign a grade for the contents of a can, the following procedure shall be adopted :

*For Grade 1* — The score for each factor individualy ( **A-2.3.2** ) shall be not less than 75 percent of the maximum score obtainable, and the overall average score shall be not less than 85 points.

*For Grade 2* — The score for each factor individually ( **A-2.3.2** ) shall be not less than 65 percent of the maximum score obtainable, and the overall average score shall be not less than 75 points.

## TABLE 3 METHOD FOR GIVING SCORES FOR CANNED PAPAYA IN SYRUP

( *Clause* A-2.2 )

| Sl No. | Organoleptic Characteristic | Requirements | Maximum Number of Points | Properties Which Reduce The Value | Points Reducing The Value Up To |
|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) |
| i) | Colour | Good, bright, uniform, characteristic of the variety and well-matured fruit; free from any discolouration due to over-ripeness, oxidation, processing or other causes | 20 | a) Not quite uniform, slightly varying shades of the characteristic colour, slight discolouration | 15 |
| | | | | b) Not very bright, not very uniform, reasonably varying in the shades of characteristic colour, a little discolouration | 13 |
| | | | | c) Dull, non-uniform, varying considerably in shades, discolouration (total) | 0 |
| ii) | *Texture and uniformity of size | Tender, fleshy, thick, unbroken units, not disintegrated; uniform in size | 25 | a) Not quite fleshy units, soft but not broken; just uniform size | 19 |
| | | | | b) Not fleshy, just firm units indicative of reasonably mature fruit. Units slightly varying in size | 16 |
| | | | | c) Firm, broken, misshapen units, non-uniform in size | 0 |
| iii) | Taste and flavour | Pleasant aroma and flavour characteristic of the variety taste characteristic of the variety, free from objectionable | 20 | a) Slight variation in normal flavour, slight smell indicative of unripe (sour) fruit | 15 |

| | | | | | |
|---|---|---|---|---|---|
| | | or off-taste, smell or odour indicative of unripe (sour and fibrous) fruit. Free from staleness or metallic taste | | b) Slightly off-taste due to metallic contamination, mildly sour smell | 13 |
| | | | | c) Objectionable or off-taste, smell of staleness, or strong smell of unripe sour fruit | 0 |
| iv) | †Absence of defects | Free from defects; free from crushed, or disintegrated broken units, blemished units or extraneous material. No unit trimmed to the extent that normal shape of unit is destroyed. Covering syrup shall be clear, free from cloudiness, blackening or thickening, from pulp, etc | 35 | a) Blemished units up to 5 percent by count; syrup with stray particles of pulp | 26 |
| | | | | b) Blemished units up to 10 percent by count; disintegrated portion or more than 5 percent of the drained weight; syrup with few particles of pulp. A few broken units | 23 |
| | | | | c) Blemished units more than 10 percent by count; crushed units; syrup cloudy, blackened, fruit pulp in the syrup | 0 |

*While rating 'Texture and Uniformity of Size', texture may be allotted 15 points and uniformity of size, 10 points.

†While rating, 'Absence of Defects', a tentative maximum score of 15 points for absence of blemishes, 5 for absence of peel and core, 5 for absence of extraneous matter and 10 for clarity of covering syrup may be considered.

## SCORE SHEET FOR INDIVIDUAL JUDGE

Sample No. ..........................

Date of Sampling.................

Details of the Sample can a) Product....................... b) Name of Manufacturer...............................

c) Type............... d) Batch No. ............... e) Date of Manufacture...............

| *Factors* | *Score Point* | *Sample Cans* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Colour | Grade 1 : 15 — 20<br>Grade 2 : 13 — 14 | | | | | | | | | | |
| Texture and uniformity of size | Grade 1 : 19 — 25<br>Grade 2 : 16 — 18 | | | | | | | | | | |
| Taste and flavour | Grade 1 : 15 — 20<br>Grade 2 : 13 — 14 | | | | | | | | | | |
| Absence of defects | Grade 1 : 26 — 35<br>Grade 2 : 23 — 25 | | | | | | | | | | |

Signature of the Judge
with Date.................

## SCORE CARD

Sample No. ..........................

Date of Sampling..................

Details of the Sample Can a) Product........................ b) Name of Manufacturer.............................

c) Type........... d) Batch No. ............... e) Date of Manufacture... ...........

| *Factor* | *Colour* | | | | | *Texture and Size* | | | | | *Taste and Flavour* | | | | | *Absence of Defects* | | | | | *Total Scores* | | | | | *Average Score for* | | | | | *Grade of the Can* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Judge Can No. | A | B | C | D | E | A | B | C | D | E | A | B | C | D | E | A | B | C | D | E | A | B | C | D | E | Colour | Texture and Uniformity of Size | Taste and Flavour | Absence of Defects | Total | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 |

( *Continued from page* 2 )

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| Dr M. S. Dhooria | Punjab State Cooperative Supply & Marketing Federation Ltd, Chandigarh |
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| Shri M. V. Sastry ( *Alternate* ) | |
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| Secretary | Development Council for Food Processing Industries ( Directorate General of Technical Development ), New Delhi |

## INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

**Base Units**

| QUANTITY | UNIT | SYMBOL |
|---|---|---|
| Length | metre | m |
| Mass | kilogram | kg |
| Time | second | s |
| Electric current | ampere | A |
| Thermodynamic temperature | kelvin | K |
| Luminous intensity | candela | cd |
| Amount of substance | mole | mol |

**Supplementary Units**

| QUANTITY | UNIT | SYMBOL |
|---|---|---|
| Plane angle | radian | rad |
| Solid angle | steradian | sr |

**Derived Units**

| QUANTITY | UNIT | SYMBOL | DEFINITION |
|---|---|---|---|
| Force | newton | N | 1 N = 1 kg.m/s$^{2}$ |
| Energy | joule | J | 1 J = 1 N.m |
| Power | watt | W | 1 W = 1 J/s |
| Flux | weber | Wb | 1 Wb = 1 V.s |
| Flux density | tesla | T | 1 T = 1 Wb/m$^{2}$ |
| Frequency | hertz | Hz | 1 Hz = 1 c/s (s$^{-1}$) |
| Electric conductance | siemens | S | 1 S = 1 A/V |
| Electromotive force | volt | V | 1 V = 1 W/A |
| Pressure, stress | pascal | Pa | 1 Pa = 1 N/m$^{2}$ |

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